



Energy From Waste

Industry Needs and Opportunities – Organic Waste to Energy

CONFIDENTIAL. This document contains trade secret information. Disclosure, use or reproduction outside Cargill or inside Cargill, to or by those employees who do not have a need to know is prohibited except as authorized by Cargill in writing.
(© Copyright Cargill, Incorporated 2009. All rights reserved.)



Speakers

Mike Richtig

Cargill Meat Solutions Corporate Environmental Manager – Wichita, KS

Kim Grieb

Cargill Meat Solutions Environmental Superintendent – Dodge City, KS



Overview

Energy From Waste

Biogas Production as a Renewable Energy Source

- Introduction

- Biogas Production

- Waste Streams

Organic Waste for a Renewable Energy Source – Fluidized Bed Boiler

- Introduction

- Waste Streams

- Energy Production



Biogas Production – Introduction

Cargill Meat Solutions treat their own wastewater in 12 plants across North America

By treating their own wastewater a renewable energy, Biogas (50-75% methane), is generated during the anaerobic stage of treatment.

The anaerobic lagoons capture the Biogas and use it for energy instead of just releasing it to the atmosphere.

At the Cargill beef processing plant in Dodge City, Kansas about 35% of the gas used in the boilers is Biogas; 65% Natural Gas.

- \$750,000 - \$1 Mill saved per year



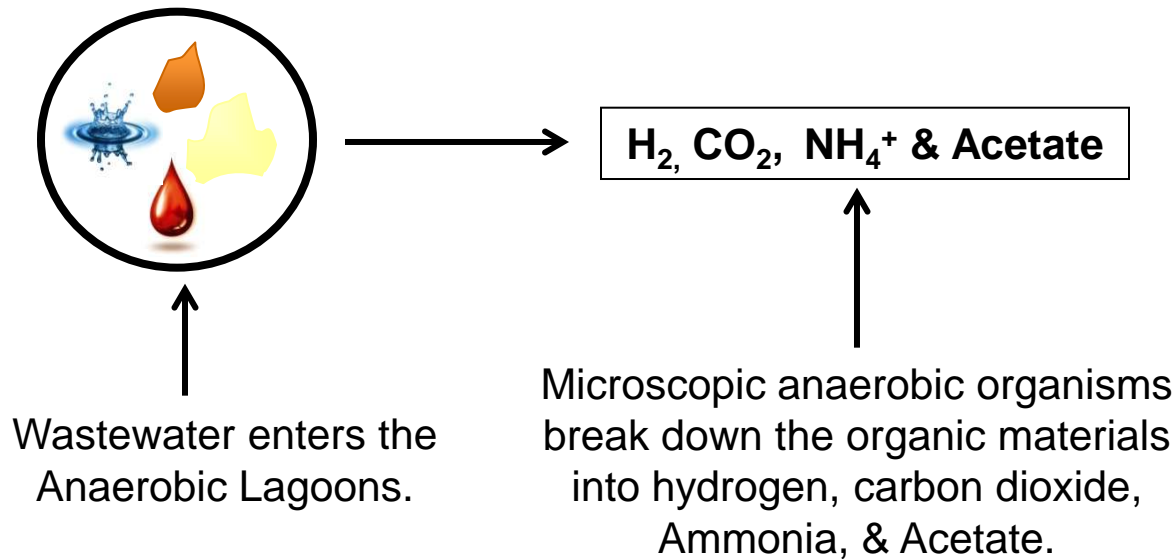
Process Inside the Anaerobic Lagoons



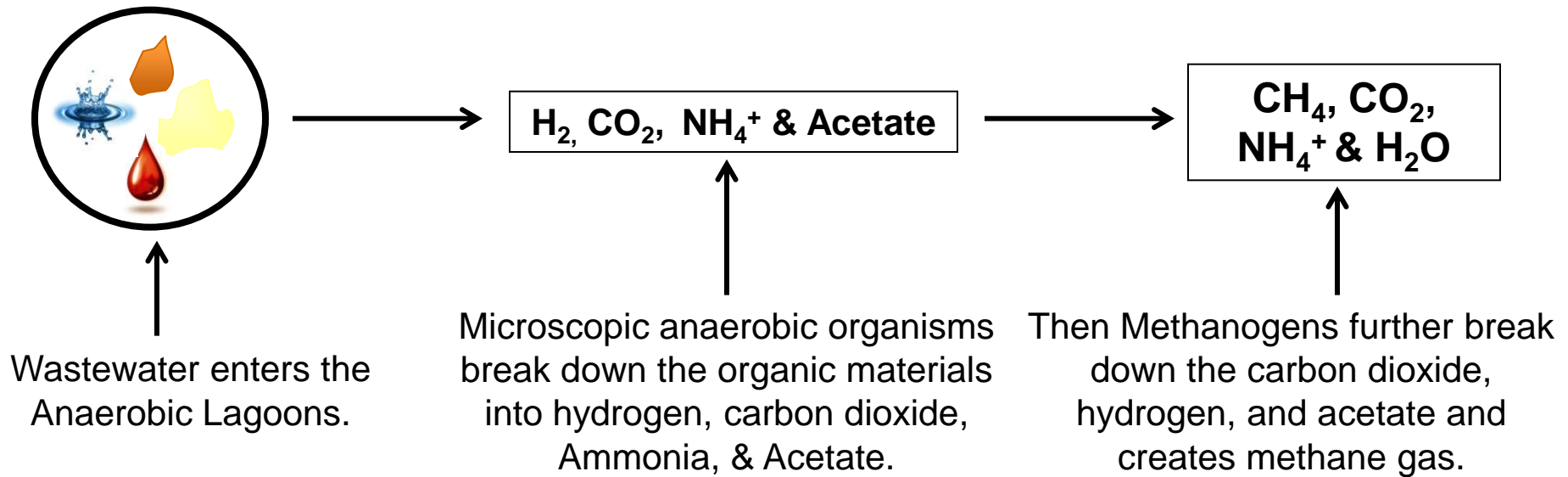
Wastewater enters the
Anaerobic Lagoons.



Process Inside the Anaerobic Lagoons

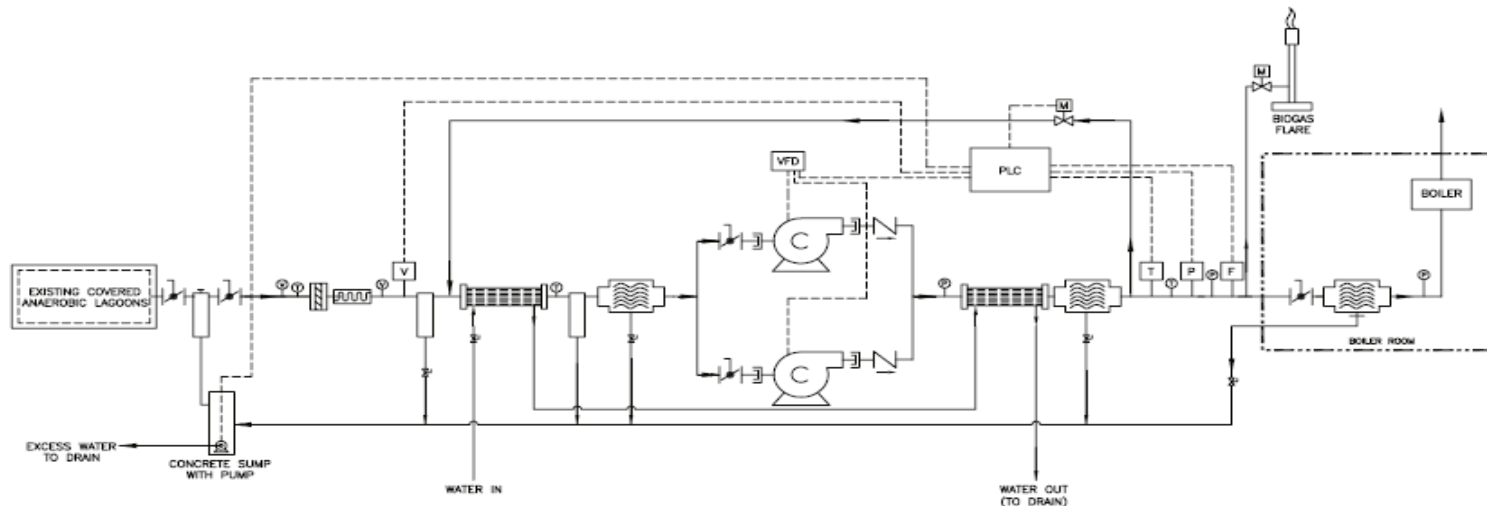
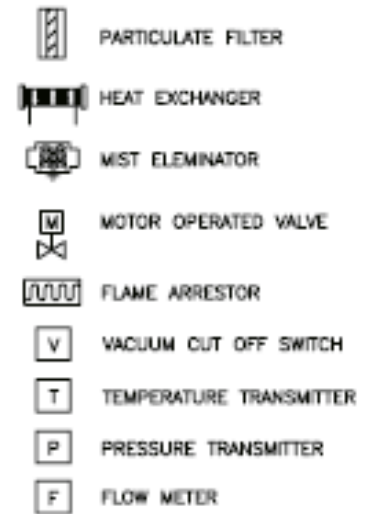


Process Inside the Anaerobic Lagoons



Biogas Reconditioning

- Improves the quality of the biogas
 - Cools air to remove moisture
 - Increases pressure in system
 - Increases purity of biogas
 - Reduces pitting and corrosion in boiler tubes



Why is anaerobic digestion a feasible application for wastewater treatment at meat processing plants?

Large Generation of Organic Waste



Waste Streams

Biogas production is generated from the anaerobic stage of wastewater treatment.

The largest contributing factor to biogas production are organic materials (OM)

Measure & Quantify

- Biochemical Oxygen Demand (BOD)
- Fats, Oils, & Greases (FOG's)
- Total Kjeldahl Nitrogen (TKN's)



Waste Streams– BOD

- Biochemical Oxygen Demand – Commonly used to indicate the organic quality of the water.
 - Contributing Factors from the Plant:
 - Organic Materials
 - Pen Manure
 - Dirt
 - Fats, oils, greases (FOG's)
 - Blood
 - Paunch



Waste Streams– FOG's

- Fats, Oils, & Greases (FOG's) are organic materials
- FOG's consist mostly of fat from the carcass
 - Trimmings
 - Tallow
- FOG's are measured daily and reported as pounds of FOG's per head killed (lbs/hd)
 - A common goal at CMS facilities is to send 4 lbs/hd of FOG's or less through the wastewater treatment facility.



Waste Streams– TKN's

- Total Kjeldahl Nitrogen (TKN's) sum of organic nitrogen, ammonia (NH_3), and ammonium (NH_4^+)
- Contributing Factors from the Plant:
 - Mostly from blood and paunch
 - Anything organic that contains nitrogen
- TKN's are measured daily and reported as pounds of TKN's per head killed (lbs/hd)
 - A common goal at CMS facilities is to send 0.9 lbs/hd of TKN's or less through the wastewater treatment facility.



Controls

- Prevent solids from entering the system
 - Liquids go to wastewater treatment plant
 - Organic solids are rendered, composted, or sent to landfill
- Dissolved Aeration Flotation (DAF)
 - Fat floated to top
 - Solids fall to bottom
- Solids

Rendered	Composted	Landfill
Meat & Bone	Paunch	SRM
Blood	Pen Manure	Trash
Fat	Sludge	

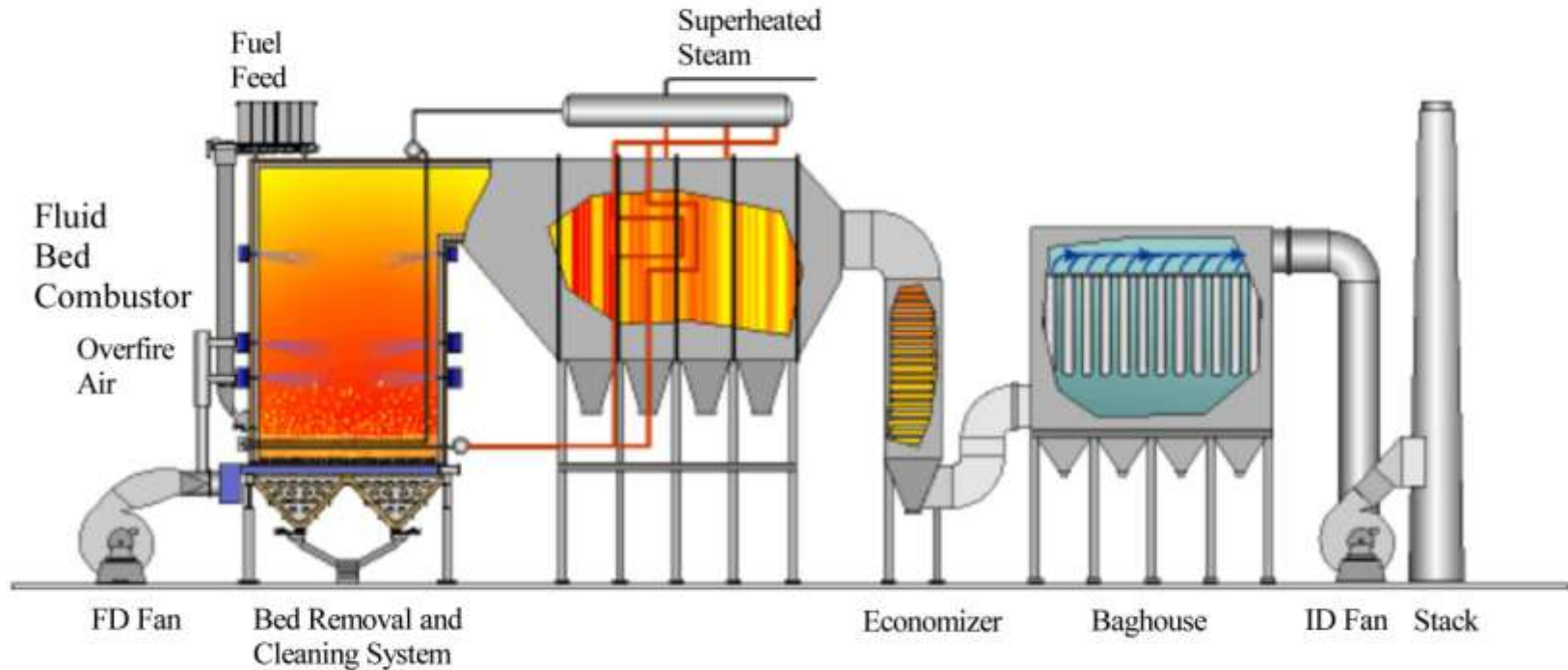


Fluidized Bed Boiler – Introduction

- Fluidized Bed Boiler (FBB) – burns organic material to generate energy
- The fluidized waste to energy project is located at the CMS beef processing facility in High River Canada.
- Results in a 97% organic waste reduction
- Provide 67% of plant steam load, in conjunction with biogas nearly 100% of plant steam will be produced from renewable/waste fuel
- Potential fossil fuel offsets for GHG credits



FBB – Energy Production



1.3 MW/h electrical production

67% of plant steam load

Waste Streams

- Specified Risk Material (SRM) Destruction
 - 913C for 4sec in combustor (causes SRM destruction)
 - High costs of SRM disposal in Canada
- Pressed Sludge & Paunch, Pen Manure, DAF Solids, Tri-Canter Solids
- No trash – plastics provide unwanted chlorides



Future Opportunities for Renewable Energy Technology

Questions?

